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Plans to De-orbit Satellite Next Month Could Prove Riskier Than Leaving It in Space

By Sharon Keeler
UNH News Bureau

DURHAM, N.H. -- University of New Hampshire space scientists are among a group of international experts lobbying NASA to keep its Compton Gamma Ray Observatory (CGRO) in orbit.

The 17-ton satellite, which houses UNH's Compton Imaging Telescope (COMPTEL) is scheduled by NASA to be directed back into Earth's atmosphere next month, where debris that survives re-entry will scatter over the ocean 2,500 miles southeast of Hawaii. The decision was based on safety after one of the three gyroscopes used to steer the craft failed in December.

There are four reasons scientists want CGRO kept in space: They believe it is safe to keep it in orbit; it's a fully functioning spacecraft that continues to return valuable scientific data; they expect a great return in solar science due to the solar maximum; and the solar activity CGRO is aimed to measure could make re-entry riskier than keeping it in orbit.

"A controlled re-entry with two gyros carries a risk of one in 29 million human casualties, while a re-entry with no gyros carries a human casualty risk of one in four million," says Jim Ryan, professor of physics in UNH's Institute for the Study of Earth, Oceans and Space, explaining the criteria NASA uses to determine the safety of its missions. "NASA guidelines specify the maximum risk for a satellite re-entry is one in 10,000. In other words, de-orbiting the Compton Observatory with no gyros is as safe or safer than any number of activities that NASA conducts."

Ryan, along with research associate professor Mark McConnell and chief operator John Macri, has overseen the operations of UNH's COMPTEL Imaging Telescope, collecting and studying its data. The telescope is one of several instruments aboard the Compton Observatory, launched in 1991 aboard the shuttle Atlantis.

Scientists want to keep CGRO in orbit because it's a $1 billion mission that has produced numerous breakthroughs in the understanding of gamma radiation from some of the most energetic phenomena in the Universe, including solar flares -- explosions of highly charged particles and ionized gas that have a direct impact on Earth.

McConnell says that, with the delayed launch of NASA's High Energy Solar Spectroscopic Imager (HESSI), CGRO is the only spacecraft in orbit capable of studying in detail these high energy emissions from the sun. Between the time the Compton Observatory is scheduled to de-orbit -- May 26, the last day of scientific data -- and the planned January 2001 launch of HESSI, there will be only limited data on high energy emission from solar flares.

These data, from a Japanese satellite called Yohkoh, will be limited in comparison to that which could be provided by CGRO or HESSI. The solar cycle peaks later this year during this gap.

The solar maximum, ironically, also throws a wrench into NASA's plans to de-orbit the satellite, making scientists even more certain that it should stay in space.

"The solar activity CGRO is programmed to measure makes it relatively dangerous to de-orbit the spacecraft during the next two or three years of the solar maximum," says Ryan, pointing out one of the most important reasons to keep it operational.

During this time, he explains, there is a significant risk of a solar flare occurring while CGRO is at low altitude. The solar flare has the effect of unexpectedly and dramatically increasing the air density at the low altitude of the spacecraft.

"Such an event would make the detailed calculations of the final trajectory inaccurate, basically turning a controlled re-entry into an uncontrolled re-entry," says Ryan. "An uncontrolled re-entry carries a human casualty risk of one in 1,000."

Ryan and others want to see an independent review conducted of the entire de-orbit plan, and they have turned to their colleagues, peers and Congress to get NASA to do so. The High Energy Astrophysics Division of the American Astronomical Society is organizing a letter campaign, and statements supporting an independent review will be issued by this organization and the American Physical Society.

"Time is of the essence," says Ryan. "The current plan is to deorbit CGRO on June 3, about three weeks from now."

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